REMARKS

Entry of the foregoing and reexamination and reconsideration of the subject application, as amended, pursuant to and consistent with 37 C.F.R. § 112, are respectfully requested in light of the following remarks.

Claims 21-39 are pending in this application.

Claims 1-19 were previously cancelled in a preliminary amendment. Claim 20 has been cancelled in this amendment.

Claims 21, 23-25, 27, 32-36 and 38 have been amended to depend from claim 22. Support for this amendment is found throughout the specification. Claim 22 has been amended to recite extracting the dicarboxylic acid formed in the oxidation step from the reaction medium. Support for this amendment is found in the specification in Example 2, page 12, line 20 to page 13, line 12.

No new matter has been added in making these amendments.

35 U.S.C. §102(b) prior art rejections

Claims 20, 21, 32-36 and 38 have been rejected under 35 U.S.C. §102(b) as being anticipated by Onopchenko et al. (U.S. Patent No. 4,032,569).

Claim 20 has been cancelled. Claims 21, 32-36 and 38, which previously depended from claim 20, have been amended to depend from claim 22. Claim 22 is not rejected under 35 U.S.C. §102(b) as being anticipated by the '569 patent. Since dependent claims 21, 32-36 and 38 depend from an independent claim that has not been reject as being anticipated, these dependent claims are not anticipated.

Applicants respectfully submit that Claims 21, 32-36 and 38 are not anticipated by the '569 patent the rejection of these claims should be withdrawn.

35 U.S.C. §103(a) Obviousness Rejections

1. Claim 22 has been rejected under 35 U.S.C. §103(a) as unpatentable over Onopchenko et al. (U.S. Patent 4,032,569) in view of Robbins (U.S. Patent 3,988,116).

Applicants respectfully submit that Claim 22 is not obvious over Onopchenko et al. in view of Robbins.

To establish a *prima facie* case of obviousness, three basic criteria must be met. (MPEP 2143) First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Onopchenko teaches a process for the oxidation of cyclohexane to adipic acid using cobaltic ions. (col. 1, lines 5-13 and 31-33) Onopchenko teaches cooling the reaction mixture at the end of the reaction period, diluting the reaction mixture with water, heating the reaction mixture to which the water was added until cobaltous ions were present, then evaporating the mixture to dryness. The dried residue was then extracted with acetone to separate the products from the catalyst. (col. 3, lines 1-12) The Office Action indicates that Onopchenko does not teach using a counter current flow liquid-liquid extraction column. (page 5, paragraph 2).

Robbins teaches an apparatus for countercurrent liquid-liquid extraction and provides extremely limited disclosure of conditions to extract one material form another. The only examples provided in Robbins are: (1) the removal of unknown

acid impurities from dinitro-ortho-secondary butyl phenol with water (col. 3, lines 66-68) and (2) the removal of acid impurities from methyl isobutyl ketone with water (col. 4, lines 36-38). In both of these examples, acid impurities were removed from a single, major component. However in the claims of the instant application, the dicarboxylic acid is extracted from a mixture comprising the oxidation solvent and the cycloaliphatic hydrocarbon.

The Office Action indicates that it would have been obvious to use the apparatus as taught by Robbins for extraction of the acids as taught by Onopchenko because Robbins teaches this is a conventional apparatus widely used in performing liquid-liquid extractions. However, the extraction of the acids taught in Onopchenko is not a liquid-liquid extraction, but rather is a liquid extraction of a solid residue formed after removal of the oxidation solvent and remaining cycloaliphatic hydrocarbon.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There is no suggestion or motivation in the cited prior art to modify Onopchenko to extract the acids from the reaction mixture as required by the instant claims. The Office Action has cited the extraction of the acids from the catalyst as the motivation to combine the cited references. However, as shown above, the extraction in Onopchenko is not a liquid-liquid extraction. Robbins also does not provide motivation to extract the dicarboxylic acid from the reaction medium comprising the oxidation solvent and remaining cycloaliphatic hydrocarbon, as required by the claims. Therefore there is no motivation or suggestion in the cited

prior art to modify the invention of Onopchenko with Robbins to obtain Applicant's invention.

To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success. There is no reasonable expectation of success in obtaining the method of the Applicant's invention by making changes to the process of Onopchenko based on the teachings of Robbins. As indicated above, Onopchenko does not perform a liquid-liquid extraction, but rather forms an extraction of a dry residue. There was not a reasonable expectation of success in extraction the dicarboxylic acid from a three component system (the dicarboxylic acid, the oxidation solvent and the cycloaliphatic hydrocarbon) using a solvent in which the oxidation solvent and the cycloaliphatic hydrocarbon are insoluble, as required by the claims. There is nothing in the cited prior art that indicates there would be a reasonable expectation of success in performing the extraction from the three component reaction medium. Robbins is directed to an apparatus and provides extremely limited disclosure of conditions to extract one material form another. The only examples provided in Robbins are: (1) the removal of unknown acid impurities from dinitro-ortho-secondary butyl phenol with water (col. 3, lines 66-68) and (2) the removal of acid impurities from methyl isobutyl ketone with water (col. 4, lines 36-38). In both of these processes, acid impurities are being removed from a single, major component. However in the claims of the instant application, the dicarboxylic acid is extracted from a mixture comprising the oxidation solvent and the cycloaliphatic hydrocarbon. There cannot have been a reasonable expectation of success in extraction the dicarboxylic acid from a three component system when Onopchenko specifically excluded two of the three required components in the step

in the applicants' method and Robbins is silent on extraction from such a system. Therefore, there was no reasonable expectation of success at the time of the invention that the claimed method could be obtained by modifying Onopchenko with Robbins.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Neither of the prior art references teach or suggest extracting the dicarboxylic acid from the reaction medium comprising the oxidation solvent and remaining cycloaliphatic hydrocarbon, as required by the claims. Therefore the cited prior art does not teach or suggest all of the limitations of the instant claims.

Therefore, in consideration of the foregoing, Applicants respectfully submit that Claim 22 is not obvious over Onopchenko et al. in view of Robbins. Applicants therefore request that this rejection be withdrawn.

2. Claims 23-26 have been rejected under 35 U.S.C. §103(a) as unpatentable over Onopchenko et al. (U.S. Patent 4,032,569) as applied to claim 20 and further in view of Robbins (U.S. Patent 3,988,116).

Claims 23-26 have been amended to depend from claim 22.

Applicants respectfully submit that Claims 23-26 are not obvious over Onopchenko et al. in view of Robbins.

The teachings of Onopchenko and Robbins have been described above.

The Office Action admits that although Onopchenko teaches extraction of the organic product from the catalyst and separation of individual acids, Onopchenko does not teach other methods of extraction. (page 6, lines 1-3)

Claims 23-26 are not obvious over Onopchenko and Robbins because, as shown above, claim 22 from which they depend is not obvious over these references. Applicants therefore request that this rejection be withdrawn.

3. Claims 27, 29, 30 and 39 have been rejected under 35 U.S.C. §103(a) as unpatentable over Onopchenko et al. (U.S. Patent 4,032,569) as applied to claim 20 and further in view of Ludmer et al. (U.S. Patent 4,954,260) (Note: The Office Action appears to have inadvertently cited this reference as U.S. Patent 4,954,206).

Applicants respectfully submit that Claims 27, 29, 30 and 39 are not obvious over Onopchenko et al. in view of Ludmer.

Claims 27, 29, 30 and 39 have been amended to depend from claim 22.

The teachings of Onopchenko have been described above.

Ludmer teaches a countercurrent separation process using two solvents that are selected such that the two solvents are essentially completely miscible at a first temperature and are immiscible at a second temperature. Ludmer states:

> It should be understood that each of the solvents used in the instant invention may comprise one compound or a plurality of compounds. When a plurality of compounds is used, it is essential that they form a single phase under the conditions of the separation and, with the other solvent, a single phase under the conditions of mixing. (col. 2, lines 25-31)

The Office Action notes that Table 1a gives a list of two component systems of solvent A and solvent B. (page 7, paragraph 6)

Applicants direct the Examiner to the last example of Table 1a, where solvent A is a mixture of cyclohexane and water and solvent B is diethyl carbinol. (col. 9, lines 1-7) Claim 22, from which claims 27, 29, 30 and 39 depend, requires extracting

the dicarboxylic acid formed in the oxidation step using a first extraction solvent in which at least the oxidation solvent and the cycloaliphatic hydrocarbon (such as cyclohexane) are insoluble. As shown in Table 1a of Ludmer, solvent A is a combination of water (a solvent into which the diacids are extracted) and cyclohexane (cycloaliphatic hydrocarbon). The requirement of using a first extraction solvent in which at least the oxidation solvent and the cycloaliphatic hydrocarbon are insoluble cannot be met when Ludmer teaches that water and cyclohexane form a single solvent.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There is no suggestion or motivation in the cited prior art to modify Onopchenko with Ludmer to obtain the method of the Applicant's invention. One of ordinary skill in the art, on reading Ludmer would recognize that water and cyclohexane could form a single solvent. Such a person would not expect that the dicarboxylic acids could be extracted from the reaction medium when Ludmer teaches that water and cyclohexane, a reactant present in the reaction medium, can combine into a single solvent. One of ordinary skill in the art, armed with such teaching, would not be motivated to combine Onopchenko with Ludmer to obtain the method of the Applicant's invention. This is especially so because the invention of Ludmer would be expected to be non-operative in the method of the instant application. Therefore there is no motivation or suggestion in the cited prior art to modify the invention of Onopchenko with Ludmer to obtain the Applicant's invention.

To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success. There is no reasonable expectation of success in obtaining the method of the Applicant's invention by making changes to the process of Onopchenko based on the teachings in Ludmer. One of ordinary skill in the art would not expect that the dicarboxylic acids could be extracted from the reaction medium as claimed in the instant application when Ludmer teaches that water and cyclohexane, a reactant present in the reaction medium, can combine into a single solvent. Therefore, there was no reasonable expectation of success at the time of the invention that the claimed method could be obtained by modifying Onopchenko with Ludmer.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Neither Onopchenko nor Ludmer teach or suggest extracting the dicarboxylic acid formed in the oxidation step from the reaction medium in a countercurrent-flow liquid/liquid extraction column using a first extraction solvent in which at least the oxidation solvent and the cycloaliphatic hydrocarbon are insoluble. Therefore the cited prior art does not teach or suggest all of the limitations of the instant claims.

Therefore claims 27, 29, 30 and 39 are not obvious over Onopchenko et al. in view of Ludmer. Applicants therefore request that this rejection be withdrawn.

4. Claims 28 and 31 have been rejected under 35 U.S.C. §103(a) as unpatentable over Onopchenko et al. (U.S. Patent 4,032,569) in view of Ludmer et al. (U.S. Patent 4,954,260).

Applicants respectfully submit that Claims 28 and 31 are not obvious over Onopchenko et al. in view of Ludmer.

Claims 28 and 31 depend from claim 22.

The teachings of Onopchenko and Ludmer have been described above.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There is no suggestion or motivation in the cited prior art to modify Onopchenko with Ludmer to obtain the method of the Applicant's invention. Onopchenko teaches a simple way to separate the organic products from the catalyst after removal of the solvent and unreacted cyclohexane. Ludmer teaches introducing the reaction medium directly into a multistage separation apparatus that requires heating and cooling, as well as the use of specific solvents such that the separation properties of the solvents are temperature dependent. There is no teaching in Ludmer as to what happens to the catalyst in their system. One of ordinary skill in the art, on reading Onopchenko and Ludmer would not be motivated to combine these references because Ludmer only adds complexity and significant costs to the simple process of Onopchenko, which easily isolates the desired dicarboxylic acid in solid form and removes the catalyst, starting materials and by-products from the desired dicarboxylic acids. Therefore there is no motivation or suggestion in Ludmer to modify the invention of Onopchenko to obtain Applicant's invention.

To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success. There is no reasonable expectation of success in obtaining

the method of the Applicant's invention by making changes to the process of Onopchenko based on the teachings in Ludmer. The properties of the solvent system taught in Ludmer prevent there from being a reasonable expectation of success. The countercurrent separation process of Ludmer requires using two solvents that are selected such that the two solvents are essentially completely miscible at a first temperature and are immiscible at a second temperature. As shown above, Ludmer teaches that solvent A is a mixture of water and cyclohexane and therefore the mixture of water and cyclohexane would separate from the second solvent, solvent B. It is unknown how the presence of the lipophilic oxidation solvent would affect the separation of solvent A from solvent B, which is required by the method. It is also unclear if the dicarboxylic acids would be extracted from the reaction medium as required by the claims since cyclohexane is taught to form a solvent with water and the dicarboxylic acids would be expected to partition into this solvent mixture. Therefore, there was no reasonable expectation of success at the time of the invention that the claimed method could be obtained by modifying Onopchenko with Ludmer.

Therefore Claims 28 and 31 are not obvious over Onopchenko et al. in view of Ludmer. Applicants therefore request that this rejection be withdrawn.

5. Claim 37 has been rejected under 35 U.S.C. §103(a) as unpatentable over Onopchenko et al. (U.S. Patent 4,032,569) as applied to claim 36.

Applicants respectfully submit that Claim 37 is not obvious over Onopchenko as applied to claim 36.

Onopchenko teaches a process for converting cyclohexane to adipic acid by oxidizing cyclohexane with molecular oxygen in the presence of critical amounts of cobaltic ions in an aliphatic monobasic acid solvent while maintaining critical temperature, pressure and contact time in the reaction zone. (Col. 1, lines 7-12)

Claim 37 requires the catalyst comprises manganese and the catalyst is used in combination with co-catalyst comprising cobalt, chromium, zirconium, hafnium or iron, alone or in combination.

Onopchenko only teaches the use of cobalt where the cobalt must be present in the form of its cobaltic ion. (col. 1, line 45) Onopchenko is silent on the use of any other catalyst, either alone or in combination with cobalt in the form of its cobaltic ion.

The Office Action acknowledges that Onopchenko does not teach elements that can be used as a catalyst.

The Office Action alleges that manganese and a co-catalyst such as cobalt could be substituted for cobalt as taught by Onopchenko and would produce the same results because all are considered transitional metals and therefore have the same properties.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There is no suggestion or motivation in Onopchenko to modify Onopchenko by the addition of a manganese catalyst. Onopchenko teaches:

Cobalt must be present in the form of its cobaltic ion. (col. 1, line 45)

> This period of induction is believed to occur in order to oxidize the cobaltous ion to the active cobaltic ion and to promote the production of free radicals from the cyclohexane charge, (col. 1, lines 64-67)

There is nothing in Onopchenko that indicates that any other transitional metal could be used in this method, especially when teaching that it must be present in the form of its cobaltic ion. One of ordinary skill in the art, on reading Onopchenko would not be motivated to change the catalyst from a catalyst that must form a cobaltic ion to a co-catalyst of manganese and cobalt because there is nothing in Onopchenko that indicates that a combination of a co-catalyst of manganese and cobalt would overcome any problem or would improve the process in any way. Therefore there is no motivation or suggestion in the cited prior art to modify the invention of Onopchenko with the cited prior art to obtain Applicant's invention.

To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success. There is no reasonable expectation of success in obtaining the method of the Applicant's invention by changing the catalyst in a method that requires a catalyst that forms cobaltic ions to a co-catalyst of manganese and cobalt. Although cobalt and manganese are both transition metals, there are significant differences between these metals. For example, cobalt ions are present in the cobaltous (+2) and cobaltic (+3) forms. However manganese is commonly found in the +2, +4 and +7 forms, and to a lesser extent can be found in the +3, +5 and +6 forms. Onopchenko teaches that cobaltic ions are required, not merely the presence of cobalt is sufficient:

> Cobalt must be present in the form of its cobaltic ion. (col. 1, line 45)

> This period of induction is believed to occur in order to oxidize the cobaltous ion to the active cobaltic ion and to promote the production of free radicals from the cyclohexane charge, (col. 1, lines 64-67)

Given this specific teaching, and the differences between cobalt and manganese, there could not have been a reasonable expectation of success in obtaining the Applicant's invention by switching the catalyst. Therefore, there was no reasonable expectation of success at the time of the invention that the claimed method could be obtained by modifying the required catalyst in Onopchenko with a different catalyst.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The Office Action acknowledges that Onopchenko does not teach elements that can be used as a catalyst. The Office Action does not provide a reference that teaches or suggest the use of a manganese catalyst. The Office Action alleges that manganese and a co-catalyst such as cobalt could be substituted for cobalt as taught by Onopchenko and would produce the same results because all are considered transitional metals and therefore have the same properties. Applicants respectfully submit that the examiner is mistaken in the conclusion that manganese could be substituted for cobalt merely because they are transition metals and therefore have the same properties. This is especially true because Onopchenko teaches that cobaltic ions are required, not merely the presence of cobalt. Onopchenko teaches:

> Cobalt must be present in the form of its cobaltic ion. (col. 1, line 45)

> This period of induction is believed to occur in order to oxidize the cobaltous ion to the active cobaltic ion and to promote the production of free radicals from the cyclohexane charge, (col. 1, lines 64-67)

There is nothing in Onopchenko that indicates that any other transitional metal could be used in this method, especially when teaching that cobalt must be present in the form of its cobaltic ion. At the time the Onopchenko patent was filed in 1975, the other transition metals were known to exist, yet none of these was even mentioned in Onopchenko. One of ordinary skill in the art would realize there are significant differences between transition metals and that one cannot merely add a metal such as manganese to a cobalt catalyst merely because they are both transitional elements. Cobalt and manganese do not necessarily have the same properties, as cobalt is in group 8B on the periodic table, while manganese is in group 7B. While cobalt ions can be present in the cobaltous (+2) and cobaltic (+3) forms, Onopchenko teaches cobalt is required to be in the cobaltic ion state, which has a valence of +3. However manganese is commonly found in the +2, +4 and +7 forms, and to a lesser extent can be found in the +3, +5 and +6 forms. This clearly demonstrates that there are differences between elements within the transition metal group and that one cannot expect transitional metal elements to be interchangeable merely because they are transition metals. Therefore the cited prior art does not teach or suggest all of the limitations of the instant claims as required.

Therefore Claim 37 is not obvious over for Onopchenko. Applicants therefore request that this rejection be withdrawn.

6. Claims 20-26 and 32-38 have been rejected under 35 U.S.C. §103(a) as unpatentable over Kollar (U.S. Patent 5,321,157) in view of Robbins (U.S. Patent 3,988,116).

Claim 20 has been cancelled and the remaining claims cited above depend from claim 22. Applicants respectfully submit that Claims 21-26 and 32-38 are not obvious over Kollar in view of Robbins.

Kollar teaches the production of adipic acid from cyclohexane using a catalyst that generates cobalt (II) or (III) ions. Kollar teaches:

> The oxidation process of the invention permits a surprisingly facile recovery of adipic acid because of the strong tendency of the oxidation effluent upon cooling to separate cleanly into phases. The large non-polar upper phase can be directly recycled for oxidation without costly processing, whereas the polar lower phase is extremely rich in adipic acid that can be recovered in high yield by filtration or centrifugation, with the filtrate or supernatant can to a large degree be directly returned to oxidation without costly reprocessing. (col. 3, lines 45-55)

> Typically, adipic acid amounting to 65-85% of that present could be directly recovered by a filtration process without a workup or concentration step that would add not only to the cost for recovery but also to the chemical complexity created by further chemical reactions in the concentration. (page 9, line 66 - page 10, line 3)

The Office Action indicates that Kollar teaches an extraction of dibasic acids by quenching. Applicants respectfully submit that the Kollar does not teach an extraction of dibasic acids by quenching. The term quenching is only used twice in Kollar:

> For measurement purposes, the starting time in the oxidations described in the examples is taken as the intercept of the slope of the S curve with the x-time axis. Furthermore, it is preferred to quench the oxidation before the top of the S curve is reached. In the zone where phase separation is beginning to occur, a disproportionate amount of oxidation of the catalyst-rich polar phase is believed to occur. This phase is rich in adipic acid and low in cyclohexane, conditions conducive to post-oxidation of adipic acid and deterioration in selectivity. Furthermore, this phase of the oxidation is a controllable feature of the reaction through removal of some water of reaction. (col. 9 lines 27-39)

> Unless otherwise indicated, the following procedure was employed for the experimental runs in the examples. A reaction mixture was formed by dissolving the catalyst in the solvent, adding the charge stock (which was cyclohexane in all of the examples), and an initiator to a 500-ml 316 stainless steel reactor equipped with a rotating magnetic agitator. The reactor was then sealed and pressurized to 14 atmospheres absolute with a mixture of 50% oxygen gas and 50% nitrogen gas. The reaction mixtures were heated to the reaction temperature, and the progress of oxidation was measured by the pressure drop due to oxygen consumption. At a chosen point, the reaction was quickly quenched by cooling by about 20°-30° C. and then worked up. (col. 9, lines 40-53)

The Office Action also states that Kollar teaches extraction of the organic product from the catalyst and separation of the individual acids. (page 11, last paragraph) Applicants respectfully submit that Kollar does not provide such a teaching and requests that the Examiner provide a specific reference to where this is found in Kollar if the Applicant's position is incorrect.

The Office Action admits that Kollar (typographically referenced as Onopchenko) does not teach using a counter current flow liquid-liquid extraction column. (page 11, last paragraph)

The teachings of Robbins have been described above.

The Office Action alleges:

> It would have been obvious to one of ordinary skill in the art at the time of the invention to use the apparatus as taught by Robbins for extraction of the acids as taught by Kollar (typographically referenced as Onopchenko) because Robbins teaches this is a conventional apparatus widely used for performing liquid-liquid extractions. Further Robbins teaches the improved design overcomes a space problem and therefore increases the flow capacity of the column. (page 12, paragraph 3)

Applicants believe that the above reference to Onopchenko was a typographic error, as these claims were rejected over Kollar, not over Onopchenko. Kollar does not teach the extraction of the acids. Rather Kollar teaches "the desired adipic acid

product is facilely and economically precipitated and removed from the system as a solid." (col. 7 lines 5-7).

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There is no suggestion or motivation in the cited prior art to modify Kollar, which removes the desired product from the reaction mixture as a solid, to use the counter-current apparatus of Robbins. As shown above, Kollar teaches:

> The oxidation process of the invention permits a surprisingly facile recovery of adipic acid because of the strong tendency of the oxidation effluent upon cooling to separate cleanly into phases. The large non-polar upper phase can be directly recycled for oxidation without costly processing, whereas the polar lower phase is extremely rich in adipic acid that can be recovered in high yield by filtration or centrifugation, with the filtrate or supernatant can to a large degree be directly returned to oxidation without costly reprocessing. (col. 3, lines 45-55) (Emphasis added)

The above passage teaches against adding a step of extracting adipic acid (the dicarboxylic acid formed in the oxidation step) by teaching that the adipic acid can easily be recovered and the other phases "can to a large degree be directly returned to oxidation without costly reprocessing." Kollar further teaches against such modification of the process by stating:

> Typically, adipic acid amounting to 65-85% of that present could be directly recovered by a filtration process without a workup or concentration step that would add not only to the cost for recovery but also to the chemical complexity created by further chemical reactions in the concentration. (page 9, line 66 - page 10, line 3) (Emphasis added)

One of ordinary skill in the art, on reading Kollar and Robbins would not be motivated to combine these references because Robbins only adds complexity to the simple

process of Kollar, which easily isolates the desired adipic acid in solid form and allows for the easy recycling of the other phases and adds costs to recovery of the adipic acid. Therefore there is no motivation or suggestion in the cited prior art to modify the invention of Kollar with Robbins to obtain Applicant's invention.

To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success. There is no reasonable expectation of success in obtaining the method of the Applicant's invention by making change to the process of Kollar based on the teachings in Robbins. Robbins is directed to an apparatus and provides extremely limited disclosure of conditions to extract one material form another. The only examples provided in Robbins are: (1) the removal of unknown acid impurities from dinitro-ortho-secondary butyl phenol with water (col. 3, lines 66-68) and (2) the removal of acid impurities from methyl isobutyl ketone with water (col. 4, lines 36-38). In both of these processes, acid impurities are being removed from a single, major component. However in the claims of the instant application, the dicarboxylic acid is extracted from a mixture comprising the oxidation solvent and the cycloaliphatic hydrocarbon. There was not a reasonable expectation of success in extraction the dicarboxylic acid from a three component system (the dicarboxylic acid, the oxidation solvent and the cycloaliphatic hydrocarbon) using a solvent in which the oxidation solvent and the cycloaliphatic hydrocarbon are insoluble. Therefore, there was no reasonable expectation of success at the time of the invention that the claimed method could be obtained by modifying Onopchenko.

Therefore claims 21-26 and 32-38 are not obvious over Kollar in view of Robbins.

Applicants therefore request that this rejection be withdrawn.

7. Claims 20, 21, 27, 29-30 and 39 have been rejected under 35 U.S.C. §103(a) as unpatentable over Kollar (U.S. Patent 5,321,157) in view of Ludmer et al. (U.S. Patent 4,954,206).

Claim 20 has been cancelled. Claims 20, 21, 27, 29-30 and 39 have been amended to depend from claim 22. However claim 22 has not been rejected as being obvious over Kollar in view of Ludmer et al. Applicants respectfully submit that Claims 21, 27, 29-30 and 39 are not obvious over Kollar in view of Ludmer et al. because they depend from a claim that is not obvious over Kollar in view of Ludmer et al.

Therefore claims 21, 27, 29-30 and 39 are not obvious over Kollar in view of Ludmer et al. Applicants therefore request that this rejection be withdrawn.

8. Claims 28 and 31 have been rejected under 35 U.S.C. §103(a) as unpatentable over Kollar (U.S. Patent 5,321,157) in view of Ludmer et al. (U.S. Patent 4,954,206).

Claim 20 has been cancelled. Claims 28 and 31 have been amended to depend from claim 22. However claim 22 has not been rejected as being obvious over Kollar in view of Ludmer et al. Applicants respectfully submit that Claims 28 and 31 are not obvious over Kollar in view of Ludmer et al. because they depend from a claim that is not obvious over Kollar in view of Ludmer et al.

Therefore claims 28 and 31 are not obvious over Kollar in view of Ludmer et al. Applicants therefore request that this rejection be withdrawn.

Applicants therefore respectfully request the withdrawal of all of these rejections.

In view of the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order. Such action is earnestly solicited.

In the event that there are any questions related to this response, or the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney at the below-listed telephone number concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: September 2, 2009

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